Patent Claims

1. Sensor layer for detecting the biological effect of substances, characterized in that the sensor layer consists of a diffusion-controlling matrix and sensors suspended therein.

2. Sensor layer according to Claim 1, characterized in that the matrix is a gel such as agarose, polyacrylates or a viscous solution.

3. Sensor layer according to Claim 1 or 2, characterized in that the sensors are prokaryotic or eukaryotic cells, subcellular particles, enzyme systems, antibodies, fluorescent sensors or indicator dyes.

4. Sensor layer according to Claim 1, characterized in that a plurality of different types of sensors or one type of sensors able to indicate different biological effects are suspended in the sensor layer.

5. Sensor layer according to any of Claims 1 to 4, characterized in that the sensor layer contains additions which control or assist the detection process.

6. Sensor layer according to Claim 5, characterized in that the additions are buffers for regulating the vitality status of sensor cells.

7. Sensor layer according to any of Claims 1 to 6, characterized in that the sensor layer contains bioluminescent substrates, chemiluminescent reagents or fluorescent reagents.

8. Sensor layer according to any of Claims 1 to 7, characterized in that the sensor layer consists of a plurality of part-layers, it being possible for the part-layers to differ in thickness and to differ by the type and amount of sensors and/or additions.

9. Sensor layer according to any of Claims 1 to 8, characterized in that preferably 2 to 8 ml, particularly preferably 3 to 5 ml, of reporter gene cell suspension are present in 50 ml of sensor layer composition.

10. Sensor layer according to any of Claims 1 to 9, characterized in that the reporter gene cell suspension has an optical density of 0.6 to 1.4 at 660 nm.

11. Sensor layer according to any of Claims 1 to 10, characterized in that the thickness of the layer is 0.1 to 10 mm, preferably 0.5 to 3 mm, particularly preferably 0.5 to 0.8 mm.

12. Method for detecting the biological effect of substances, characterized in that

a.) the sample to be assayed is put onto or into the surface of a carrier, or is already a constituent of a surface to be assayed,

b.) the carrier is covered with a sensor layer from one of Claims 1 to 11 unless the sensor layer itself serves as carrier,

c.) the effect of the substance or substances present in the sample on the sensors in the sensor layer is determined.

13. Method according to Claim 12, characterized in that the sensor layer is itself used as carrier.

14. Method according to Claim 12 or 13, characterized in that on use of a sensor layer which contains cells as sensors the determination of the effect of the substances present in the sample on the sensors is preceded by an incubation step in which the sensor layer or the carrier covered with the sensor layer is stored in accordance with the requirements of the cell lines employed under defined conditions in relation to temperature, humidity and gas introduction for a preset time.

15. Method according to any of Claims 12 to 14, characterized in that the effect of the substance on the sensors consists of location-dependent induction or quenching of the emission of light from bioluminescent or chemiluminescent processes, induction or quenching of the fluorescent emissions and an integral or spectral alteration in the absorption of light.

16. Method according to any of Claims 12 to 15, characterized in that the substances in the sample are concentrated by specific or nonspecific adsorption onto suitable carrier materials before they are brought into contact with the sensor layer.

17. Method according to any of Claims 12 to 16, characterized in that the sample to be assayed is a mixture of substances which is fractionated by chromatography or electrophoresis or using other analytical or preparative separation techniques before it is brought into contact with the sensor layer.

18. Method according to Claim 17, characterized in that the chromatographic separation into fractions takes place in a chromatography column, and the eluate is applied either continuously or at intervals to various points on the carrier.

19. Method according to Claim 17, characterized in that the chromatographic separation into fractions takes place by thin-layer chromatography or electrophoresis on the carrier which is covered with the sensor layer.

20. Method according to any of Claims 12 to 19, characterized in that the sample to be assayed is a mixture of substances, and the detection of the biological effect of the individual substances in the mixture of substances is linked to a detection of the structure of the individual substances by the mixture of substances being separated into fractions by chromatography or electrophoresis or with other analytical or preparative separation techniques, and each fraction being investigated by spectroscopy before it is brought into contact with the sensor layer.

21. Method according to Claim 20, characterized in that the data from the spectroscopic investigation are analysed only for the fractions on which a biological effect can be detected by the sensor layer.

22. Method according to Claim 20 or 21, characterized in that the chromatographic separation of the mixture of substances into fractions takes place in a chromatography column, and part of the eluate is continuously applied to various points on the carrier, while another part of the eluate is simultaneously diverted through a mass spectrometer or an NMR spectrometer or an IR spectrometer for spectroscopy.

23. Method according to Claim 22, characterized in that the eluate from the chromatography column is detected by a UV detector before diverting the portion for spectroscopy.

24. Method according to Claim 20 or 21, characterized in that the chromatographic separation of the mixture of substances into single substance zones takes place by thin-layer chromatography or electrophoresis on the carrier, and spectra are recorded from the single substance zones by MALDI mass spectroscopy or raman spectroscopy or other spectroscopic methods such as UV-VIS or IR before the carrier is covered with the sensor layer.

25. Apparatus for detecting the biological effect of substances consisting of a sensor layer according to any of Claims 1 to 11 which is in contact with the sample to be assayed, and of an imaging system in whose detection zone a part or the whole of the sensor layer is located.

26. Apparatus according to Claim 25, characterized in that the sensors in the sensor layer indicate their activity by emission or quenching of the emission of light, and that the imaging system detects this emission of light.